

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	GEOKEMIJA OKOLJA
COURSE TITLE:	GEOCHEMISTRY OF THE ENVIRONMENT

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Varstvo okolja in ekotehnologije, 1. stopnja	Environmental Protection and Eco-technologies, 1st level	2., 3.	2,3rd

Vrsta predmeta / Course type Izbirni predmet / Optional subject

Univerzitetna koda predmeta / University course code: GEO

Predavanja Lectures	Seminar Seminar	Sem. Vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
22		15	8		100	4

Nosilec predmeta / Lecturer: doc. dr. Svetina Veder Marta

Jeziki / Languages:	Predavanja / Lectures:	Slovenski / Slovenian
	Vaje / Tutorial:	Slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

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Prerequisites:

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Vsebina:

- Zemlja kot endogen sistem snovi in eksogen sistem energije.
- Planetarni način dojetanja naravnih pojavov in okoljevarstvenih problemov.
- Mehanizmi geokemije in njigova interdisciplinarna povezava.
- Globalni in lokalni pomena hidrogeokemičnega cikla.
- Geokemični cikli snovi.
- Predstavitev konkretnih geokemičnih problemov in ovrednotenje njihovega pomena.
- Interpretacija geokemičnih podatkov za oceno obremenjenosti okolja in tveganja za zdravje.
- Povezovanje geokemičnih raziskav z drugimi okoljskimi raziskavami in izsledki.
- Seminarska naloga z namenom samostojnega raziskovanja konkretnega okoljskega geokemičnega problema in iskanja ustrezne literature, kontaktov in metod za rešitev problema.

Content (Syllabus outline):

- Earth as an endogenous system of substances and an exogenous energy system.
- Global perceiving natural phenomena and environmental problems.
- Mechanisms of geochemistry and their interdisciplinary connection.
- The global and local importance of the hydrogeological cycle.
- Geochemical cycles of the substance.
- Presentation of concrete geochemical problems and evaluation of their importance.
- Interpretation of geochemical data to assess the environmental burden and health risks.
- The collaborative learning method links geochemical research with other environmental research and findings.
- Seminar work with the purpose of independent research of a concrete

environmental problem

Temeljni literatura in viri / Textbooks:

- Geochemistry, William M.White, Wiley-Blackwell, 2013;
- Principles of Environmental Geochemistry, G. Nelson Eby, Waveland Press Inc., 2016.
- actual articles and books

Cilji in kompetence:

- Poznavanje in razumevanje planeta Zemlje kot endogenega sistema snovi in eksogenega sistema energije.
- Razvili planetarni način dojetanja naravnih pojavov in okoljevarstvenih problemov.
- Razumevanje mehanizmov geokemije in njigova interdisciplinarna povezava.
- Razumevanje globalnega in lokalnega pomena hidrogeološkega cikla.
- Na osnovi pridobljenega znanja pridobili sposobnost reševanja konkretnih okoljevarstvenih problemov.
- Sposobnost ocene tveganja konkretnega okoljevarstvenega problema v interdisciplinarni in globalnem smislu.
- Sposobnost zbiranja in interpretacije ustreznih podatkov za oceno geokemične obremenjenosti okolja.
- Sposobnost povezave geokemičnih raziskav z drugimi okoljskimi raziskavami in izsledki.
- Sposobnost samostojnega raziskovanja geokemičnega problema in iskanja ustrezne literature, kontaktov in metod za rešitev problema.
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Objectives and competences:

- Knowledge and understanding of the planet Earth as an endogenous system of matter and an exogenous energy system.
- Develop a planetary way of perceiving natural phenomena and environmental problems.
- Understanding mechanisms of geochemistry and their interdisciplinary connection.
- Understanding the global and local importance of the hydrogeological cycle.
- Based on the acquired knowledge, they have acquired the ability to solve specific environmental problems.
- Ability to assess the risks of a specific environmental problem in interdisciplinary and global .
- Ability to collect and interpret relevant data for assessing the geochemical environmental burden.
- Ability to link geochemical research with other environmental research and findings.
- Ability to independently explore the geochemical problem and find suitable literature, contacts and methods for solving the problem.

Predvideni študijski rezultati:

Študentje predmeta bodo:

- Razumeli temelje geologije.
- Razumeli področje geokemije okolja in njegovo povezavo z drugimi vedami.
- Razumeli geokemično kroženje snovi.
- Razumeli faktorje in procese, ki vplivajo na usodo in prenos onesnažil v različnih sferah okolja.
- Razvijali veščine uporabe geokemičnega znanja na praktičnih okoljevarstvenih problemih.

Intended learning outcomes:

Students will:

- Understood the basic of geology.
- Understand the field of geochemistry and its connection with other disciplines.
- Understand the geochemical circulation of matter.
- Understand the factors and processes that affect the fate and transfer of pollutants in different spheres of the environment.
- Develop skills in using geochemical knowledge on practical environmental issues.

Metode poučevanja in učenja:**Oblike dela:**

- predavanja
- laboratorijske in terenske vaje
- samostojno delo študentov/tk

Metode dela:

- razlaga
- dialog, diskusija
- preučevanje praktičnih primerov
- aktivno skupinsko delo
- terensko and practical delo
- priprava, predstavitev in zagovor seminarske naloge

Learning and teaching methods:**Forms of teaching:**

- In-class lectures
- Laboratory and field work
- Individual work of students

Teaching methods:

- Explanation
- Discussion, debate
- Practical demonstration
- Teamwork
- Field and practical work
- Involvement of experts in the specific fields preparation, presentation of a seminar paper

Delež (v %) /

Weight (in %)

Načini ocenjevanja:

- kolokvij iz praktičnih vaj
- pisni izpit
- seminarske naloge

Na vajah je obvezna vsaj 90-odstotna prisotnost. Študent mora izdelati seminar in kolokvij, potem lahko pristopi h končnemu pisnemu izpitu

Ocenjevalna lestvica:

- zadostno 6: 60-67%
- dobro 7: 68-75%
- prav dobro 8: 76-83%
- prav dobro 9: 84-90%
- odlično 10: 91-100%

20
60
20

Assessment:

- colloquium of practical work
- written exam
- seminar work

At least 90% attendance at lab work is required. Students must first pass colloquium of practical work, presented seminar work, which is a prerequisite for final written examination.

Grading system:

- Sufficient D (6): 60-67%
- Good C (7): 68-75%
- Very good B (8): 76-83%
- Very good B+ (9): 84-90%

Excellent A (10): 91-100%

Materialni pogoji za izvedbo predmeta :

- predavalnica z multimedijско opremo

Material conditions for subject realization:

- classroom with the multimedia equipment

Obveznosti študentov:

- Obvezna udeležba na predavanjih
- Seminarska naloga

Student's commitments:

- Mandatory attendance at lectures
- Seminar work

Reference nosilca predmeta:**Lecturer's references:**

IZOBRAZBA

- 1987 diplomirala na Fakulteti za naravoslovje in tehnologijo na Oddelku za geologijo Univerze v Ljubljani na področju hidrogeologije.
1994 opravila interdisciplinarni magisterij iz kemije, geologije in pedologije na Fakulteti za naravoslovje in tehnologijo, Oddelek za geologijo, Univerza v Ljubljani.
- 1999, diplomirala na Fakulteti za naravoslovje in tehnologijo, Oddelek za geologijo, Univerza v Ljubljani, na področju geokemije.

STROKOVNE IZKUSNJE

- 1987-1988 zaposlena v Premogovniku Velenje kot hidrogeologinja, ki se ukvarja s statističnim ocenjevanjem, izračunavanjem razmerja med fizikalnimi lastnostmi premoga in električnimi meritvami.
- 1989 - 2004 zaposlena v ERICu Velenje, kot raziskovalka geološke znanosti na področju ekologije, s poudarkom na preučevanju vpliva onesnaženosti zraka na tla in izvirsko vodo, osnovna poklicna dejavnost je geokemija (anorganske spojine). Vpeljali smo vodno tehniko (poskusni pokrov) in druge terenske poskuse v Sloveniji, osredotočili smo se na onesnaženje težkih kovin v tleh v nenasičenem vodnem okolju, uporabili računalniške modele za preučevanje obnašanja težkih kovin, uporabili biogeokemijske metode za oceno tveganja za zdravje onesnaževalcev, izkušnje z različnimi spektroskopskimi in mikroskopskimi metodami.
- 2004 zaposlena v Javni agenciji za tehnološki razvoj Republike Slovenije kot vršilka dolžnosti direktorice z namenom ustanovitve agencije, 2005 je postala generalna direktorica in zapustila funkcijo v letu 2007.
- 2007 - 2008 zasebna raziskovalka na področju okolja.

ZNANSTVENE IZKUSNJE

- 1990-1994 gostujoča raziskovalka na Institutu Jožef Stefan v Ljubljani, Oddelek za jedrsko kemijo, z uporabo metode INAA na osnovi k₀ za določanje elementov v sledovih v vzorcih vode in tal.
- Leta 1998 gostujoča študentka doktorskega študija in Inštitutu za geokemijo okolja na Univerzi v Heidelbergu, ki jo je podprta DAAD, na področju hidrogeokemičnega modeliranja v nenasičenih tleh.
- 2002-2003 je gostujoča podoktorska raziskovalka na Univerzi v Tokiu na Japonskem, podprta s strani JSPS, na področju geokemičnih raziskav kamnin, raziskav izotopov žlahtnih plinov meteoritov.

EDUCATION

- 1987 graduated from the Faculty of Natural Science and Technology, Department of Geology, University of Ljubljana, at the field of hydrogeology.
- 1994 interdisciplinary Master's degree in the Faculty of Natural Science and Technology, Department of Geology, University of Ljubljana.
- 1999 doctorate at the Faculty of Natural Science and Technology, Department of Geology, University of Ljubljana, in the field of geochemistry.

PROFESSIONAL EXPERIENCES

- 1987-1988 employed at Velenje Coal Mine as hydrogeologist, working on statistical estimation, computing the relationship between physical properties of coal and electric measurements.
- 1989 – 2004 employed at ERICo Velenje, as an earth science researcher in the field of ecology, with the priority to study the influence of air pollution on soil and spring water, first occupation is geochemistry (inorganic compounds). Introduced the watershed technique (catchment experiment) and other field experiments in Slovenia, focused on heavy metal pollution of soil in unsaturated cone, used the computer models for study the behaviour of heavy metals species, used biogeochemical methods for estimation the health risk of pollutants, have experience with different spectroscopic and microscopic methods.
- 2004 employed at Public Agency for Technology Development of the Republic of Slovenia as acting director with the aim to establish the agency, 2005 became director general and left the position in 2007.
- 2007 – 2008 privat researcher in the field of environmental.

SCIENTIFIC EXPERIENCES

- 1990-1994 visiting researcher, working at the Institute "Jozef Stefan" Ljubljana, Department of Nuclear Chemistry, using the k₀ - based method of INAA for determination of trace elements in water and soil samples.
- In 1998 visiting Ph. D. student in Institute for environmental geochemistry at University of Heidelberg, supported by DAAD, in the field of hydro-geochemical modelling in unsaturated soils.
- 2002-2003 visiting postdoctoral student in Tokyo University, Japan, supported by JSPS, in the field of geochemical investigation of rock materials, noble-gas isotopes investigation of meteorites.

